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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,172	09/10/2003	Haw-Jye Shyu	95.756	1530

26384 7590 08/26/2004

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EXAMINER

AKHAVANNIK, HUSSEIN

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/662,172	<b>Applicant(s)</b> SHYU, HAW-JYE	
	<b>Examiner</b> Hussein Akhavannik	<b>Art Unit</b> 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 12-22 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed September 10, 2003 on pages 7-8 of the Remarks have been fully considered but they are not persuasive.

The Applicant alleges that the Composite Hough Transform (CHT) exploits a set of geometric constraints to fuse sensor data from multiple dual-channel sensor system for target detection and track parameter estimation. The Examiner agrees that the specification does teach the CHT exploiting geometric constraints to fuse sensor data. However, claims 12-21 do not recite "geometric constraints" and claim 22 merely states using "geometric constraints" without providing the details of the constraints.

Furthermore, the CHT is recited as an intended use of the computer system in independent claims 12 and 13 ("a computer system for") and 22 ("a computer for"). A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See MPEP 2114, *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

### ***Drawings***

2. The drawings are objected to because:

Figure 5 contains reference label 52 which is never explained in the specification.

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Figures 7B-7C contain reference numbers 74, 76, 78, and 82 which are not explained in the specification.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application.

*Specification*

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification. The following are a few examples of the objections to the disclosure:

On page 43, line 15 "(c0" should be changed to "(c)".

On page 5, line 24, the comma at the end of the sentence should be changed to a period to signify the end of the sentence.

On page 7, line 13, the word "redcesa" is not known.

On page 11, lines 10-11, the description of figures 17c and 17d are given further down on page 11 and are not needed on lines 10-11.

On page 11, lines 16-21, the description of figures 18a-18c need to end in a period, similar to the other figure descriptions on page 11.

On page 17, lines 13-14, it is stated, "two-sensor system 51 to the CPA point 53. Second, move along the CPA ray 55," the reference numbers 51, 53, and 55 are never explained in the figures of this application.

On page 17, line 17, it is stated, "The two sensors 52 and 54 are" but 54 should be changed to 56 to correspond to the figures of this application.

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On page 17, lines 20-21, the reference number 57 and 59 are never illustrated in the figures of this application.

On page 31, line 12, "Figures 181 through 18d" should be changed to "Figures 18a through 18d".

On page 33, lines 11-12, the second detected pair and the third detected pair both have the same reference number.

Appropriate correction is required.

***Information Disclosure Statement***

4. Applicant is respectfully requested file an IDS to provide copies of the various papers cited on pages 1, 15, 21, and 22 of the specification, particularly the Stevens NRL Report and the Brannan Naval Tech. Report, so as to complete the disclosure. If these reports are classified or otherwise unavailable, then all references to them ought to be removed from the specification and replaced with only that material necessary for a complete understanding of the present invention.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21 recites the limitation "the second sensor array" in line 6. There is insufficient antecedent basis for this limitation in the claim.

***Double Patenting***

7. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

8. Claims 21-22 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 6,724,916 (herein Shyu). This is a double patenting rejection.

Referring to claim 21,

- i. A digital storage device for storing the digitized data corresponds to "a digital storage device" in claim 1 of Shyu.
- ii. A computer for retrieving data from the data storage device and computing a hypothesis reference track relative to a primary sensor array corresponds to "a computer for retrieving data from the data storage device and hypothesizing a track with track parameter values ( $\theta$ ,  $v$ ,  $D$ ,  $t_{01}$ )" in claim 1 of Shyu.
- iii. Computing a hypothesis reference track relative to a secondary sensor array corresponds to "computing a delay curve parameter ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) for a secondary array based on geometric constraints involving said track parameter values" in claim 1 of Shyu.
- iv. Calculating an associated delay in a primary correlogram for the primary array corresponds to "generating a corresponding template delay curve in a primary correlogram" in claim 1 of Shyu.

- v. The computer calculating an associated delay in a secondary correlogram for the secondary array corresponds to “generating a corresponding template delay curve in a secondary correlogram” in claim 1 of Shyu.
- vi. The computer accumulating data for the reference track by simultaneously integrating a series of pixel values along the appropriate delay curve in the primary and secondary correlograms corresponds to “combining the integrated values and storing it in the corresponding composite Hough space” in claim 1 of Shyu.
- vii. Storing the accumulated pixel values in composite Hough space and thresholding the accumulated pixel values to detect the track corresponds to “thresholding accumulated pixel values to detect the track” in claim 1 of Shyu.

Referring to claim 22,

- i. A digital storage device corresponds to “a digital storage device” in claim 1 of Shyu.
- ii. A computer for retrieving data from the data storage device and hypothesizing a track with track parameter values  $(\theta_1, v, D, t_{01})$  corresponds to “a computer for retrieving data from the data storage device and hypothesizing a track with track parameter values  $(\theta, v, D, t_{01})$ ” in claim 1 of Shyu.
- iii. Generating a corresponding template delay curve in a primary correlogram corresponds to “generating a corresponding template delay curve in a primary correlogram” in claim 1 of Shyu.

- iv. Performing integration along the template delay curve in the primary correlogram corresponds “performing integration along the template delay curve in the primary correlogram” in claim 1 of Shyu.
- v. Computing a delay curve parameters ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) for a secondary array based on geometric constraints corresponds to “computing a delay curve parameter ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) for a secondary array based on geometric constraints involving said track parameter values” in claim 1 of Shyu.
- vi. Generating a corresponding template delay curve in a secondary correlogram based on the delay curve parameters ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) corresponds to “generating a corresponding template delay curve in a secondary correlogram based on the delay curve parameters ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ )” in claim 1 of Shyu.
- vii. Performing integration along the template delay curve in the secondary correlogram corresponds to “performing integration along the template delay curve in the secondary correlogram” in claim 1 of Shyu.
- viii. Computing a delay curve parameter ( $\theta_{2m}$ ,  $v/D_{2m}$ ,  $t_{02m}$ ) for the secondary array based on geometric constraints corresponds to “computing a delay curve parameter ( $\theta_{2m}$ ,  $v/D_{2m}$ ,  $t_{02m}$ ) for the secondary array based on geometric constraints” in claim 1 of Shyu.
- ix. Generating a corresponding template delay curve in a secondary correlogram corresponds to “generating a corresponding template delay curve in a secondary correlogram” in claim 1 of Shyu.

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- x. Combining the integrated values and storing it in the corresponding composite Hough space corresponds to “combining the integrated values and storing it in the corresponding composite Hough space” in claim 1 of Shyu.
- xi. Thresholding the accumulated pixel values to detect the track corresponds to “thresholding the accumulated pixel values to detect the track” in claim 1 of Shyu.

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 12-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 of U.S. Patent No. 6,724,916 (herein Shyu) in view of Kakinami et al (U.S. Patent No 5,892,855).

Referring to claim 12,

- i. A plurality of arrays for receiving signals from a target corresponds to “a plurality of arrays of sensors for receiving signals from a target” in claim 1 of Shyu.
- ii. A receiver for receiving signals from the plurality of sensors corresponds to “a receiver for receiving signals received by the plurality of sensor arrays” in claim 1 of Shyu.

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iii. An analog/digital converter for converting the signals received from the sensor arrays to digital format is not explicitly claimed by Shyu. However, Kakinami et al illustrate an A/D converter in figure 6 by reference number 16c. It would have been well known to one of ordinary skill in the art at the time the invention was made to use an A/D converter to convert analog signals received by an analog source to digital signals to be processed by a computer, such as the computer in claim 1 of Shyu or the CPU illustrated by Kakinami in figure 6 by reference number 11 because a computer can only process digital signals and A/D converters are well known to in the art to convert analog signals to digital signals.

iv. A digital storage device for storing the digitized data corresponds to “a digital storage device” in claim 1 of Shyu.

v. A computer system for retrieving the stored digitized data from the plurality of sensor arrays and processing the data through the use of a composite Hough transform to determine the track of the target corresponds to “a computer for retrieving data from the data storage device and hypothesizing a track with track parameter values ( $\theta$ ,  $v$ ,  $D$ ,  $t_{01}$ )”, “combining the integrated values and storing it in the corresponding composite Hough space”, and “thresholding accumulated pixel values to detect the track” in claim 1 of Shyu.

Referring to claim 13,

i. One or more arrays of sensors for receiving signals from a target corresponds to “a plurality of arrays of sensors for receiving signals from a target” in claim 1 of Shyu.

ii. Means for receiving signals received by the plurality of sensor arrays corresponds to “a receiver for receiving signals received by the plurality of sensor arrays” in claim 1 of Shyu.

iii. Means for converting the signals received from the sensor arrays to digital format if required is not explicitly claimed by Shyu. However, Kakinami et al illustrate an A/D converter in figure 6 by reference number 16c. It would have been well known to one of ordinary skill in the art at the time the invention was made to use an A/D converter to convert analog signals received by an analog source to digital signals to be processed by a computer, such as the computer in claim 1 of Shyu or the CPU illustrated by Kakinami in figure 6 by reference number 11 because a computer can only process digital signals and A/D converters are well known to in the art to convert analog signals to digital signals.

iv. Means for storing the digitized data from the sensor arrays corresponds to “a digital storage device” in claim 1 of Shyu.

v. A computer system for retrieving the stored digitized data from the sensor arrays and processing the data through the use of a composite Hough transform to determine the track of the target corresponds to “a computer for retrieving data from the data storage device and hypothesizing a track with track parameter values ( $\theta$ ,  $v$ ,  $D$ ,  $t_{01}$ )”, “combining the integrated values and storing it in the corresponding composite Hough space”, and “thresholding accumulated pixel values to detect the track” in claim 1 of Shyu.

Referring to claim 14, this claim corresponds to claim 2 of Shyu.

Referring to claim 15, this claim corresponds to claim 3 of Shyu.

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Referring to claim 16, this claim corresponds to claim 4 of Shyu.

Referring to claim 17, this claim corresponds to claim 5 of Shyu.

Referring to claim 18, this claim corresponds to claim 6 of Shyu.

Referring to claim 19, the means for converting the signals from the sensor arrays to a digital format is an analog to digital converter corresponds to claim 12iii.

Referring to claim 20, the means for storing the digitized data from the sensor arrays is a computer is not explicitly explained by Shyu. However, Kakinami et al illustrate an image memory in figure 6 by reference number 15a. It would have been well known to one of ordinary skill in the art at the time the invention was made to use a computer to store the digitized data from the sensor arrays because computer are well known to have memory and the computers in claim 1 of Shyu and in figure 6 of Kakinami both process the information stored.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 12-13, 15-16, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakinami et al (U.S. Patent No 5,892,855) in view of Yankowich et al (Yankowich, S.W.; Farooq, M.; A Hough transform based multisensor, multitarget track initiation technique; Decision and Control, 1997, Proceedings of the 36th IEEE Conference on, Volume: 5, 1997 Page(s): 5018 -5023).

Referring to claim 12, which is representative of claim 13,

- i. A plurality of arrays for receiving signals from a target is illustrated by Kakinami et al in figure 1a as the first, second, and third camera.
- ii. A receiver for receiving signals from the plurality of sensors is illustrated by Kakinami et al in figure 1A as the first, second, and third image processor.
- iii. An analog/digital converter for converting the signals received from the sensor arrays to digital format is illustrated by Kakinami et al in figure 6, reference number 16c.
- iv. A digital storage device for storing the digitized data is illustrated by Kakinami et al in figure 6, reference number 15a and explained in column 8, lines 46-53.
- v. A computer system for retrieving the stored digitized data from the plurality of sensor arrays is illustrated by Kakinami et al in figure 6, reference number 11. However, Kakinami et al do not explicitly explain processing the data through the use of a composite Hough transform to determine the track of the target. However, Yankowich et al explain combining sensory data from multiple search scans to detect tracks using the Hough Transform of the composite data on page 5018, first column, third paragraph. Yankowich et al explain that the Hough transform has been proposed as an effective means for achieving target track initiation by combining sensory data from multiple search scans into one multidimensional data map in page 5018, paragraph 3. Furthermore, Yankowich et al illustrate that the Hough transform may be used to track objects from two sensors in figure 1 on page 5019. In order to collect the information of one or multiple objects from two sensors, Kakinami et al illustrates a system with multiple cameras and processors in figure 1a. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use cameras, analog-

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to-digital converters, and storage means to store the digital image data about an object being tracked, as suggested by Kakinami et al in the system of Yankowich et al because as Yankowich et al illustrate multiple sensors being employed to track an object.

Referring to claim 15, the sensors for retrieving data being electromagnetic sensors is illustrated by Kakinami et al in figure 6, reference number 16b as the first camera. This video camera is capable of sensing light, which is electromagnetic energy. Furthermore, Yankowich et al explain using data from radar on page 5021, first column, third paragraph, which can also sense electromagnetic energy. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an electromagnetic sensor because radar is common in the military field.

Referring to claim 16, the sensors for retrieving signals from a target being optical sensors is illustrated by Kakinami et al in figure 6, reference number 16b as the first camera.

Referring to claim 19, the means for converting the signals received from the sensor arrays to a digital format is an analog-to-digital converter corresponds to claim 12iii.

Referring to claim 20, the means for storing the digitized data from the sensor arrays being a computer is explained by Kakinami et al in column 8, lines 60-67.

13. Claims 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakinami et al in view of Yankowich et al, and further in view of Monroe (U.S. Patent No. 5,798,458).

Referring to claim 14, the sensors for receiving signals for a target being acoustic sensors is not explicitly explained by Kakinami et al or Yankowich et al. However, Monroe illustrates a plurality of acoustic sensors in figures 2 and 3, reference numbers 19a to 19m. The tracking

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system of Yankowich et al can easily be directed towards determining a track of an object underwater, as long as the object motion information is collected. The plurality of acoustic sensors illustrated by Monroe are capable of collecting object motion data under water.

Therefore, it would have been an obvious matter of design choice to modify the system of Kakinami et al and Yankowich et al by using an acoustic sensor, since the Applicant has not disclosed that using an acoustic sensor solves any stated problem or is for any particular purpose and it appears that acoustic sensors would perform equally as well as electromagnetic sensors to derive motion information of on object.

Referring to claim 17, the receiver being an acoustic receiver is not explained by Kakinami et al or Yankowich et al. However, Monroe illustrates a multiplexer (96) and Digital Signal Processor (296) in figures 2 and 3 to receive the signals from the acoustic sensors. The tracking system of Yankowich et al can easily be directed towards determining a track of an object underwater, as long as the object motion information is collected. The plurality of acoustic receivers illustrated by Monroe are capable of collecting object motion data under water. Therefore, it would have been an obvious matter of design choice to modify the system of Kakinami et al and Yankowich et al by using an acoustic receiver, since the Applicant has not disclosed that using an acoustic receiver solves any stated problem or is for any particular purpose and it appears that acoustic receivers would perform equally as well as electromagnetic receivers to derive motion information of on object.

14. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kakinami et al in view of Yankowich et al, and further in view of Holmberg (U.S. Patent No. 5,838,816).

Referring to claim 18, the receiver being a sonar signal receiver is not explicitly explained by either Kakinami et al or Yankowich et al. Yankowich et al so explain using data from radar on page 5021, first column, third paragraph. However, Holmberg illustrate a sonar receiver in figure 2 as reference number 12. The sonar receiver corresponds to the radar receiver of Yankowich et al, except that sonar is used for underwater object motion detection. Therefore, it would have been an obvious matter of design choice to modify the system of Kakinami et al and Yankowich et al by using a sonar signal receiver, since the Applicant has not disclosed that using a sonar signal receiver solves any stated problem or is for any particular purpose and it appears that sonar signal receivers would perform equally as well as electromagnetic receivers to derive motion information of on object.

15. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shyu (Shyu, Haw-Jye; Applying morphological filters to acoustic broadband correlograms; Systems, Man, and Cybernetics, 1997. Computational Cybernetics and Simulation., 1997 IEEE International Conference on, Volume: 5, 1997 Page(s): 4182 –4187) in view of Kakinami et al.

Referring to claim 21,

- i. A data storage device is not explained by Shyu, but is illustrated by Kakinami et al in figure 6, reference numbers 15a, 12, and 13 as the image memory, RAM, and ROM.
  - ii. A computer for retrieving data from the data storage device is not explained by Shyu, but is illustrated by Kakinami et al in figure 6, reference number 11 as the CPU.
- Hypothesizing a reference track relative to a primary sensor array is explained by Shyu on page 4183, second column, second paragraph. Hypothesizing a reference track relative to a second sensor array is not explicitly explained by Shyu, however, Shyu does

suggest using a two-sensor system in the abstract. Furthermore, a multi-sensor system illustrated by Kakinami et al in figure 1a maybe used, wherein a reference track would be hypothesized for each sensor array and therefore, a reference track relative to the secondary array would be hypothesized.

iii. Calculating an associated delay in a primary correlogram for the primary array is explained by Shyu on page 4183, second column, third paragraph.

iv. Calculating an associated delay in a secondary correlogram for the secondary array corresponds to claim 21 iii, wherein the associated delay curve is calculated for the secondary array.

v. Accumulating data for the reference track by simultaneously integrating a series of pixel values along the appropriate delay curve in the primary and secondary correlograms is explained by Shyu on page 4183, second column, second paragraph.

vi. Storing the accumulated pixel values in composite Hough space is explained by Shyu on page 4183, second column, second paragraph. Thresholding the accumulated pixel values to detect the track is explained by Shyu on page 4183, second column, second paragraph.

In order to collect object motion data to use in the tracking system of Shyu et al, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multiple sensor system suggested by Kakinami et al as Shyu explains that data from multiple sensors may be used to detect object close to the sensor system.

Referring to claim 22,

- i. A data storage device and computer for retrieving data from the storage device correspond to claim 21i-ii.
- ii. Hypothesizing a track with track parameter values ( $\theta_1$ ,  $v$ ,  $D$ ,  $t_{01}$ ) is explained by Shyu on page 4183, second column, second paragraph as hypothesizing a group of image features.
- iii. Generating a corresponding template delay curve in a primary correlogram corresponds to claim 21iii.
- iv. Performing integration along the template delay curve in the primary correlogram corresponds to claim 21v.
- v. Computing a delay curve parameters ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) is explained by Shyu on page 4183, second column, second paragraph as hypothesizing a group of image features, which can be applied to a second sensor.
- vi. Generating a corresponding template delay curve in a secondary correlogram based on the delay curve parameters ( $\theta_2$ ,  $v/D$ ,  $t_{02}$ ) is explained by Shyu on page 4183, second column, third paragraph. Note that the equation explained does contain  $v/D$  and can be used for the data from the secondary array.
- vii. Performing integration along the template delay curve in the secondary correlogram corresponds to claim 21v.
- viii. Computing a delay curve parameter ( $\theta_{2m}$ ,  $v/D_{2m}$ ,  $t_{02m}$ ) for the secondary array based on geometric constraints is explained by Shyu on page 4183, second column, second paragraph as hypothesizing a group of image features. Note that the image features may be based on a series of geometric constraints.

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- ix. Generating a corresponding template delay curve in a secondary correlogram corresponds to claim 21iv.
- x. Combining the integrated values and storing it in the corresponding composite Hough space corresponds to claim 21v-vi.
- xi. Thresholding the accumulated pixel values to detect the track corresponds to claim 21vi.

### ***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Lee and Shyu (Lee, Y.P.; Haw-Jye Shyu; Performance of detect-on-track in a high shipping environment; OCEANS '96. MTS/IEEE. Prospects for the 21st Century. Conference Proceedings, Volume: 3, 1996 Page(s): 1313 –1318) – To exhibit acoustic tracking using the Hough transform.

Saban (U.S. Patent No. 6,043,867) – To exhibit a tracking system using a multitude of sensors such as infrared and electromagnetic sensors, performing analog-to-digital conversion, and using the Hough transform.

Bober et al (U.S. Patent No. 6,356,647) – To exhibit a Hough transform used for determining the motion of an object in an image as explained in the abstract.

Russo (U.S. Patent No. 6,173,074) – To exhibit acoustic signature recognition using the Hough transform as explained in column 5, line 54 to column 6, line 4.

Wilt (U.S. Patent Pub. No. 2002/0114518) – To exhibit the Hough transform detecting features from an image as explained in the abstract.

Art Unit: 2621

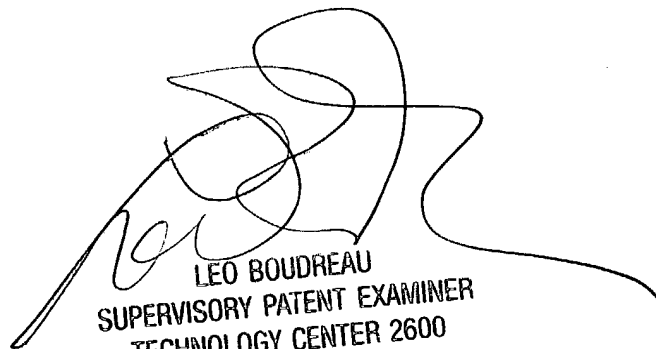
17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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August 15, 2004

HA

  
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